

Prevalence and Characteristics of Autism Spectrum Disorder Among Children Aged 8 Years — Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2018

Supplementary Material

Supplementary Box. ADDM-designated “qualified professionals” for collecting information from autism evaluations and cognitive ability

Type of qualified professional*	Degree or specialty
Physician	Medical doctor (MD) or doctor of osteopathy (DO) in the following specialties <ul style="list-style-type: none"> • Developmental Pediatrics • Family Medicine • Neurology • NOS (Not Otherwise Specified) • Pediatrics • Psychiatry (including subspecialties such as child psychiatry)
Nurses	<ul style="list-style-type: none"> • Clinical Nurse Specialist (CNS) • Nurse Practitioner (NP) • Nurse, Other
Educators	<ul style="list-style-type: none"> • B.A. (Bachelor of Arts in General Education or Special Education) • Educator Ed.S. (Education Specialist) • M.A., M.Ed., M.S. (Master of Arts, Education, Science in Education) • Diagnostician, Learning Specialist (Master’s level) • Educator NOS (Not Otherwise Specified) • Ph.D. (Doctor of Philosophy in Education) • Ed.D. (Educational Psychology)
Psychologists	<ul style="list-style-type: none"> • Ed.D. (Educational Psychology) • Ed. S. (Education Specialist) • Ph.D. (Doctor of Philosophy) • Psy.D. (Doctor of Psychology) • M.A. (Master of Arts) • M.Ed. (Master of Education) • M.S. (Master of Science) • NOS (Not Otherwise Specified)
Other professionals	<ul style="list-style-type: none"> • Applied Behavioral Analysis (ABA) Therapist M.A. (Master of Arts) • Licensed Professional Counselor (LPC) • Occupational Therapist (OT) • Physical Therapist (PT) • Physician Assistant (PA) • Social Worker

*A qualified professional for autism is defined as a medical, clinical, or educational professional in a position to evaluate developmental functioning of children.

Supplementary Table 1. R packages used for statistical or graphical output

Citation	Package	Function	Use
1	epiR	epi2by2()	Calculate prevalence ratios and 95% confidence intervals
2	Hmisc	binconf()	Calculate prevalence and 95% confidence intervals
3	ggplot2	ggplot()	Visualize data
4	rcompanion	percentile_test()	Permutation test for comparing medians
5	DescTools	CochranArmitageTest()	Cochran Armitage Trend test for associations between ASD prevalence and SES Tertiles
6.	Eulerr	euler()	Create Euler plot

1. Stevenson M. epiR: Tools for the Analysis of Epidemiological Data [Internet]. Available from: <https://CRAN.R-project.org/package=epiR>
2. Harrell, Jr FE. Hmisc: Harrell Miscellaneous [Internet]. 2021. Available from: <https://CRAN.R-project.org/package=Hmisc>
3. Wickham H. ggplot2: Elegant Graphics for Data Analysis [Internet]. Springer-Verlag New York; 2016. Available from: <https://ggplot2.tidyverse.org>
4. Mangiafico S. rcompanion: Functions to Support Extension Education Program Evaluation. R. [Internet]. 2021 Available from: <https://CRAN.R-project.org/package=rcompanion>
5. Andri Signorell et mult. al. DescTools: Tools for descriptive statistics. [Internet] 2021 Available from: <https://cran.r-project.org/web/packages/DescTools/index.html>
6. Larsson J. eulerr: Area-Proportional Euler and Venn Diagrams with Ellipses. R package version 6.1.1, [Internet] 2021 Available from <https://CRAN.R-project.org/package=eulerr>.

Supplementary Table 2. Percent of children with autism spectrum disorder that were ascertained only through manual review of a child’s records, by site, among children aged 8 years— Autism and Developmental Disabilities Monitoring Network, 11 sites, United States, 2018

ADDM Site	% of ASD cases only ascertained through manual chart review	% of requested records fully accessible for chart review
Arizona	11.2	100
Arkansas	9.9	98.1
California	2.2	99.8
Georgia	11.1	66.6
Maryland	2.4	31.4
Minnesota	5.8	99.9
Missouri	5.4	100
New Jersey	7.1	99.7
Tennessee	6.3	85.4
Utah	4.4	67.7
Wisconsin	6.5	100
Total	6.3	87.1
Total among sites with full access to >98% of requested records	6.5	99.7

Abbreviations: ADDM, Autism and Developmental Disability Monitoring Network; ASD, autism spectrum disorder.

Supplementary Table 3. Additional detail on the availability and distribution of intelligence quotient scores among children aged 8 years with autism spectrum disorder — Autism and Developmental Disabilities Monitoring Network, 11 sites, United States, 2018

SITE	Total no. with ASD	No.	With IQ information		Cognitive level		
			% of total with ASD	Median (interquartile range) age in months of most recent test or impression	% IQ ≤70	% IQ 71-85	% IQ >85*
Total	5058	3007	59.5	72 (56–89)	35.2	23.1	41.7
Arizona	331	290	87.6	85 (64.25–94)	31.4	23.8	44.8
Arkansas	353	313	88.7	74 (64–90)	39.9	25.2	34.8
California	586	454	77.5	72 (47–85)	20.5	25.6	54.0
Georgia	514	353	68.7	73 (60–90)	38.5	18.4	43.1
Maryland	423	141	33.3	58 (35–81)	44.7	17.7	37.6
Minnesota	277	225	81.2	74 (60–86)	28.9	19.1	52.0
Missouri	405	130	32.1	72 (62–81.5)	26.2	24.6	49.2
New Jersey	491	315	64.2	68 (57–91.5)	34.6	27.3	38.1
Tennessee	573	360	62.8	60 (34–79)	52.5	19.2	28.3
Utah	548	207	37.8	80 (67–91)	27.1	31.9	41.1
Wisconsin	557	219	39.3	66 (53–82)	44.7	20.5	34.7
Female	945	537	56.8	72 (53–90)	35.6	25.3	39.1
Male	4111	2470	60.1	72 (56–88)	35.1	22.6	42.2
White	2407	1402	58.2	73 (57–89)	29.7	22.7	47.6
Black	1041	570	54.8	68 (52–86)	49.8	21.9	28.2
Hispanic	1019	677	66.4	74 (57–90)	33.1	25.7	41.2
Restricted to sites collecting ID data on >60% of children							
Total	3125	2310	73.9	72 (56–89)	35.0	22.8	42.2
Female	559	409	73.2	72 (53–90)	34.2	24.7	41.1
Male	2565	1901	74.1	72 (57–89)	35.1	22.4	42.5
White	1234	945	76.6	72 (57–90)	29.2	22.0	48.8
Black	718	480	66.9	68.5 (52–86)	49.8	23.3	26.9
Hispanic	776	602	77.6	75 (57.25–90)	31.7	25.1	43.2

Supplementary Table 4. Number and percentage of children aged 8 years with autism spectrum disorder who were born in-the state of their residence at age 8 years and received a comprehensive evaluation by a qualified professional at age ≤ 36 months, by site and IQ category — Autism and Developmental Disabilities Monitoring Network, 10 sites, United States, 2018*

SITE	Total with evaluations			IQ ≤ 70			IQ > 70		
	Total [§]	Percent evaluated by 36 months	Median age in months of first evaluation	Total	Percent evaluated by 36 months	Median age in months of first evaluation	Total	Percent evaluated by 36 months	Median age in months of first evaluation
Arizona	244	42.2	41	70	52.9	35	145	37.2	44
Arkansas	274	34.7	44	105	45.7	41	141	30.5	45
California	459	46.6	38	76	55.3	34	301	51.2	36
Georgia	308	50.3	36	98	57.1	34.5	149	49.7	37
Maryland	226	44.7	38.5	58	67.2	31.5	64	53.1	34
Minnesota	222	36.5	45	49	53.1	35	139	33.1	46
Missouri	348	39.7	44	25	36.0	45	82	23.2	65.5
New Jersey	383	43.3	40	91	44.0	39	163	49.7	37
Tennessee	381	43.8	40	138	73.2	31	123	31.7	49
Utah	397	39.3	45	48	45.8	44	119	41.2	41
Wisconsin	398	40.5	45	80	72.5	30	87	47.1	39
Total	3640	42.2	41	838	57.0	35 [†]	1513	41.9	41

Abbreviations: IQ, intelligence quotient

*Note: these results calculate earliest evaluation according to how it was calculated in previous Autism and Developmental Disability Monitoring Network (ADDM) reports. The sample was restricted to children with evaluations that were born in same state as their age-8 year ADDM site. Here, the earliest evaluation is determined by the earliest comprehensive evaluation that was directly collected by the surveillance system – prior reports of evaluations or diagnoses were not included in this metric. Restricting the sample to children with birth certificates helps ensure that children would be less likely to be missing evaluations if they moved into the surveillance area at an older age. This is in contrast to the method in the report, which includes all children, but also includes all information about when a child was first evaluated (including prior evaluations reported in a collected evaluations, and historical autism-related diagnoses). Overall, the method in the report leads to a somewhat higher proportion of children evaluated by 36 months than the previous method (47% vs 42%); however, comparisons should be interpreted in the context of the different methods (Previous: only children with linked birth certificates and only counting evaluations obtained by the system. Current: all children with ASD but include all mentions of previous evaluations and diagnoses).

[†] permutation test comparing median age of earliest known evaluation for children with known IQ ≤ 70 vs. known IQ > 70 , p -value < 0.001